DOCUMENT RESUME

ED 330 705 TM 016 273

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TITLE Use of LAN Technology To Enhance the Quality of Field Based Teacher Education Programs.
PUB DATE Apr 91
NOTE 22p.; Paper presented at the Annual Meeting of the American Educational Research Association (Chicago, IL, April 3-7, 1991).
PUB TYPE Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Comparative Analysis; *Computer Uses in Education; *Education Majors; Electronic Mail; Elementary Secondary Education; Facsimile Transmission; *Field Experience Programs; Higher Education; *Local Area Networks; *Program Improvement; *Teacher Education Programs; Teacher Supervision

ABSTRACT

The adaptation and use of local area network (LAN) computer technology as an educational enhancement and as a social process in a university teacher education program were studied. The LAN technology, electronic bulletin board, and facsimile machines were used to enhance university supervised clinical settings for novice teachers in the public schools. Fifty-eight novice teachers (students in a teaching methods course) were grouped into one control group and two experimental groups in four teacher education field placement sites. All novice teachers were able to consult with faculty members by telephone or through visits; those at the experimental sites had access to electronic mail and facsimile equipment after training in its use. Subjects answered a survey, completed a journal, and wrote an essay to provide information about their communication with the teacher education faculty during their field experience. Interviews and observations provided additional data. Ease of contact, attitude toward use of technology in schools, types of message content, and frequency of communications increased for participants in experimental groups. It is suggested that LAN technology can effectively support field-oriented teacher education programs. Seven tables present study data. (SLD)

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USE OF LAN TECHNOLOGY TO ENHANCE THE QUALITY OF FIELD BASED TEACHER EDUCATION PROGRAMS

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Presented at the Annual Meeting of the American Educational Research Association, Chicago, April, 1991

USE OF LAN TECHNOLOGY TO ENHANCE THE QUALITY OF FIELD BASED TEACHER EDUCATION PROGRAMS

Introduction

Approximately 60% of states in the USA now operate a statewide computer or telecommunications network (Lavin & Phillipo, 1990). Major functions of these networks include state reporting, student information systems, electronic mail, financial management systems, instructional resource data bases, and teacher certification records. Seventy-five percent of the state networks link externally to other agencies, institutions, and networks in and out of the state. In a survey performed by the Merrimack Education Center (Lavin & Phillipo,1990) it was concluded that access to telecommunications systems and willingness to use them exists in many of the nations 16,000 school districts today. The survey additionally reported that states using networks ranked primary network users in order of frequency as principals, state departments of education, business managers, superintendents, teachers, curriculum specialists, librarians, personnel at institutions of higher education, and school board members. It appears that preservice and inservice teacher education programs at institutions of higher education have yet to adopt communication technologies as a means of enhancing program efficiency and effectiveness.

Studies reporting the effects of technology in teacher training using computers, interactive video-discs, computer networking, etc., have been reviewed by Brooks and Kopp (1989b). In the 72 studies reviewed, they found a lack of research relating to technological assistance in preservice and inservice teacher education. They concluded that important preservice program content and experience themes do not appear to be included in the research to date which explores the potential of technological assistance (Brooks and Kopp, 1989a). A review of the above sources and other current literature finds research relating to the effective use and outcomes of networking technology in teacher education are especially deficient.

The literature does include a description of the recent development of local area networks (LAN) connecting the university campus with novice teacher experiences in schools. Perry and Brooks (1987) have described the EDTNet at Miami University in Oxford, Ohio. EDTNet links student teachers and instructional supervisors together with an electronic mail and conferencing system, a curriculum content data base, university faculty, and bulletin board announcements. Supervisors participate in advising from their offices as well as their homes. Swift

and Coxford (1988) report the establishment of MICH: EdCorps at the University of Michigan. The MICH: EdCorps Network connects colleges of education throughout the state of Michigan. First year teachers at Harvard Graduate School of Education are connected in a LAN with the purpose of enhancing first year teaching experiences (Merseth, 1988). Student teachers are connected with the school of education through a LAN at the Curry School of Education at the University of Virginia in a network known as Teacher-LINK (Bull, Harris, Lloyd & Short, 1989). These and other current LAN projects place teacher education at the center of experimentation.

The broad application of LAN technologies to teacher education is only just beginning. If novice teachers are expected to be familiar with and innovative in using LAN technology they deserve early and continuous exposure to technological assistance strategies at all levels of the preservice curriculum. Two modes by which this could occur is: 1) through university faculty modeling instructional LAN assistance throughout the preservice curriculum and 2) use of LAN technology in field settings not only to enhance teacher knowledge but also to create new opportunities and ways of facilitating reflective decision making.

Electronic Mail

Electronic-Mail(E-Mail) is one method of networking computers that improves the quantity and quality of communication. E-Mail allows you to send and receive messages and share similar information such as group documents and announcements. There are many other advantages to E-Mail communication systems. E-Mail communication networks increase the frequency of interactions, improves productivity, removes the need for great amounts of note paper and computer paper, reduces the amount of telephone time greatly, and reduces the need for face-to-face interactions. One of the greatest advantages to E-Mail is that you can communicate with another person without that person being available at the exact same time. E-Mail systems can easily be linked by a Novel File Server, Fiber Octive Cables, or over telephone lines as long as the computers are equipped with modems.

Messages from all persons linked through E-Mail are sent over telephone lines or network cable to a centralized electronic mail facility, known as the electronic mailbox. All messages are stored here until a member of the network logs onto the system and calls up their messages. After messages are called up they are displayed on a computer screen and can be printed off or stored on a floppy disk.

Messages can be sent to a person sitting in the same room as easily

Messages can be sent to a person sitting in the same room as easily as to a person 2500 miles away, often in a different country. Individual messages can be sent that contain "Eyes Only" material or messages can be sent to large numbers of people at the same time. Networks have proven to be most effective when large numbers of people can be accessed via the E-Mail network.

The following charts are typical screens that appear while using E-Mail. The opening menu provides the user with a wide variety of options. The most widely used functions are the
F3 = E-Mail and the F4 = Calendar functions. Other options at this point on the network are Word Processing, Spread Sheets, Data Bases, Maps, Graphics and various tutorials. An example follows:

Network Applications

A) Word Processing
B) Spread Sheets & Data Bases
C) Maps
D) Graphics
E) Forms
F) Tutorials
G) Logout
H) Exit

Fl=Help F2=Calc F3=E-Mail F4=Calendar

After choosing the F3 (E-Mail) function the following window appears. This provides the users with another list of options. It also informs you about the messages you have. At this point, you can either read your messages or prepare a message. The following is an example of the Mailbox Window.

CC: Mail **MAILBOX WINDOWS** **Cynthia Sunal**

	MSGS	NEW		MSGS	NEW
INBOX	8	3	BULLETIN BOARD	O	O

MAIN MENU
READ INBOX MESSAGES
PREPARE MESSAGE
RETRIEVE MESSAGES
MANAGE MAILBOX
EXIT

Choosing the READ INBOX MESSAGES option will allow the network users to see the list of messages. This list states the name of the message's sender, the date that it was sent and a brief description of the topic. An example follows:

INBOX			
8 JOY BROWN	2/8/91	831t	SCHOOL VISIT
7 PAM MARTIN	2/7/91	745t	LESSON PLAN
6 MIKE SMITH	2/2/91	1046t	INVENTORY
5 MICHELLE BELL	1/28/91	1113t	DUE DATES
4 JOHN ADAMS	1/28/91	836t	VISIT ML KING
3 PAUL JASON	1/27/91	500t	DIRECTING TEACHER
2 PAULA STACY	1/26/91	489t	TEACHING PROBLEM
1 JAN ROBERTS	1/23/91	679t	CLASS PROBLEM

After checking your messages you can now prioritize them according to your preference. Once you have read a message you also have the option of deleting it from your INBOX. The following chart is an example of an E-Mail message.

{8} FROM: Jay Brown, directing teacher, M.L. King Intermediate School 4/5/91 2:02PM (583 bytes: 6 ln)
TO: Dennis Sunal
SUBJECT: Concern about classroom science lesson

MESSAGE CONTENTS

I need have your input on the procedures Janice is using in my classroom in teaching the concepts of heat and temperature. Janice will begin her lesson .... I question the full accuracy of the science content and the teaching strategy she is using for this fourth grade class. What are your thoughts in this matter. I can sure use some additional information and suggestions on how to procede with Janice.

Problem

Technology can be understood as tools (and their uses) or understood as a social process (Fleming, 1989). As a social process, knowledge created by science and technology is put at the disposal of people who in general are not themselves competent in these knowledge bases. Those who use LAN technology in this way decide as managers what benefits may accrue from the use of the products of technology. These decisions may be unrelated to the scientific and technical knowledge base. To understand technology in teacher education, then, requires that one understand the

social as well as other expected factors related to those who make decisions or use the technology.

To implement this viewpoint a study was designed to investigate the adaptation and use of LAN technology as educational enhancement as well as a social process in a university teacher education program. The LAN technology, electronic bulletin board and facsimile machines, was used to enhance university supervised clinical settings for novice teachers in the local public schools. The technology was designed to be moved periodically to follow the novice teachers as they are placed at different field sites. The factors studied related the amount of training, access time, presence of facilitators, and type of administrative support to communication in field clinical settings. Thus, the study considered the impact of local area network technology (LAN) at four teacher education field placement sites.

The problem of the study focused on three areas. First, how do differing school organization types relating to the use of LAN technology effect the communication patterns and attitudes of novice teachers? Second, what novice teacher experience characteristics relate to attitude and use of LAN technology in a field setting? Third, how does use of and attitude toward LAN technology relate to ratings and analysis of lesson planning performance of novice teachers while in their field classrooms?

Methods/Data Sources

Fifty-eight novice teachers were grouped into one control and two experimental groups determined by placement in schools with varying instructional organizations for incorporating the LAN technology. The novice teachers were involved in a field-oriented teacher education program. In this program, during the semester prior to student teaching early childhood and elementary teacher education students participated in a blocked set of six methods courses. As part of this methods block the students taught in an all-day field placement which was four weeks long. Course instructors visited novice teachers while they were at their placement but were not immediately available to students since the instructors had other responsibilities which included moving between the four schools, teaching other courses, and attending meetings.

In all schools university supervisors were available every day for consultation and advising in addition to regular observation evaluations. Campus visits and phone calls to faculty were also used by these novice teachers during this time. In the experimental schools, in addition to these forms of communication all the individuals involved, university students, faculty, site supervisors and site cooperating teachers were

able to communicate using the electronic mail and facsimile equipment set up at the university and at the public schools.

Communication

Communication during the field experience had proven to be difficult during prior semesters. Faculty visited the field placement sites and also held office hours in the late afternoon and evenings on campus. Often novice teachers, cooperating teachers, and supervisors could not easily contact faculty by telephone as they moved between field placement sites and the university. As a result these individuals had to make a trip to campus. Many of these visits to campus did not result in finding the appropriate faculty members. Return telephone calls from faculty to novice teachers, cooperating teachers, and supervisors were also difficult to make as school telephones were busy, or the individuals being called were in class and could not come to the telephone. As a result, faculty often moved back and forth between field placement sites trying to make contact with others involved in the field placement. Contact between faculty members was also difficult except for weekly Block faculty meetings because of the movement between field placement sites and the university.

There was a need for frequent communication between all involved in the field placement. Faculty members specified assignments to be carried out in the field placement. These ranged from teaching units to cognitive developmental testing of students. Many assignments built on previous assignments. Thus, assignments often involved new lessons developing out of lessons taught during the previous week or out of other activities. Faculty members typically expected novice teachers to model strategies in lesson planning and instruction. As a result novice teachers, cooperating teachers, and supervisors often needed to communicate with faculty in order to thoroughly discuss progress, make decisions on next steps, and evaluate accomplishments. Communication was an essential component of the field placement as it evolved.

Training

Training in use of the LAN technology involving electronic mail and facsimile machines for all novice teachers, faculty and supervisors was provided before the field experience. The 30 to 40 minute sessions included procedures for sending and receiving messages. A university technology specialist trained faculty and supervisors. The supervisors, in turn, trained the novice teachers for whom they were responsible. When

the novice teachers went out into their field placement, they trained their cooperating teacher.

Site Organization

The site organization differed in a variety of ways including amount of training, access time, presence of facilitators, and type of administrative support. The school sites consisted of four elementary schools located in a mixed rural and urban (small city) environment. A mixture of blue collar and professional neighborhoods were served by the schools. Three types of sites were used in the study, control (1 school), experimental restricted (1 school), and experimental facilitated (2 schools).

The control school environment was not different from the others in size of school or type of student. It did not, however, have LAN technology so that all participants in the field placement relied upon telephone communication and personal visits.

The experimental restricted school had LAN technology available through the electronic bulletin board and facsimile machine. At this school, administrators restricted use of the LAN technology to two hours daily, from 7:30 a.m. to 8:30 a.m. and from 2:30 pm to 3:30 pm. School was in session from 8:00-8:30 and from 2:30-3:00. As a result novice teachers, cooperating teachers, and supervisors were often involved in classrooms at this time as school began or students were dismissed. One limitation was imposed by the restriction of hours. A second limitation was imposed because half of the available time coincided with busy periods during the day when participants were usually unable to use the LAN technology. A third limitation was imposed because the supervisors who had trained the students used the LAN technology less than did supervisors at the facilitated experimental site. As a result the use of the technology was less frequently modeled for the novice teachers and cooperating teachers.

The experimental facilitated environment involved two schools. These schools were similar in student characteristics to the control and the experimental restricted schools. Together they served approximately the same number of novice teachers as did the experimental restricted school and the control school. At these schools the LAN technology was always available to participants. The supervisors who had trained the novice teachers frequently used the technology and typically suggested that a participant use the technology to communicate with another participant before suggesting any other form of contact.

Data Collection

The primary data collection methods were based on both quantitative and qualitative research methodology and involved survey instruments, interviews of samples of all groups, case descriptive essays, and classroom observation. The distinctive feature of the study was that the quantitative information obtained on background, use, and attitudes supplemented that obtained on reports and perceptions of the social environment. These data sources furnished a realistic picture of communication occurring in the field setting between specific players, novice teachers, faculty, and supervisors. Data was collected before, during and after the field experience on choice of communication medium, choice of content, type of message content, school organization type relating to use of LAN technology, contact persons, ease and facilitation of contact, attitude, and frequency of communication.

Five data sources were used. The first was a survey instrument, Communication Assessment, given before and at the conclusion of the field placement. The survey requested background information, expectations, and perceptions of all the novice teachers on communication through LAN technology.

The second data source was a journal, the Communication Journal. It was kept by all novice teachers and university staff to record all communications between the field experience participants. Information requested included: individuals contacted, topic of the communication, type of communication used (eg. phone, meet at office, fax etc.) and comments on the results of the communication.

The third data source was an essay, Communication Results, written by all participants about their perception of the quality and results of the communication which occurred during the field placement in the schools.

Interviews served as a fourth data source. The Open-Ended Communication Interview was used. It requested further information and verification for the essay instrument, Communication Results. Eight sample novice teachers, eight sample cooperating teachers and two faculty were interviewed.

The fifth data source was observational ratings and analysis, Microteaching Skills Rating System (MSRS), of novice teachers lesson planning performance while in their field schools. A description of the instrument, including reliability and validity measures, has been reported in previous studies (Sunal, 1982 and Sunal and Sunal,1985). These novice teacher ratings were part of the formal evaluation for the blocked campus courses the students were involved in. The analysis protocols were the

expected model lesson planning behaviors to be demonstrated as a result of the methods course experience. Three lesson plans actually taught in school classrooms were rated for each novice teacher. Following teaching, all novice teachers submitted the lesson plans, self evaluations, pupil evaluation results, and pupil work sheets for rating using the MSRS.

Data Analysis

Field reports from interviews and observations were discussed and used to help formulate tentative assertions which were further explored during data analysis using other data sources. Analysis of the data included descriptive and inferential statistics, narrative analysis, and use of triangulation in confirmation of results.

Results

During the field experience in schools, the communications between campus and schools of the study participants were sampled in regard to: frequency, participants involved, type, and content. About 75% of all recorded professional contacts used LAN technology (table 1). About 6% of these LAN technology contacts involved peer-to-peer contacts rather than the expected novice teacher and faculty communication. The remaining communications were completed by face-to-face meetings on campus or by telephone to campus offices to make contact with faculty. About 10% of these last communications involved telephone conversations.

Table 1 about here

The average number of weekly communications between campus and schools made by novice teachers varied by school site location (table 2). In school sites where LAN technology was facilitated, novice teachers made on average more than five contacts each week using all the monitored communication types. This compares to a lower number of contacts made by the experimental restricted group, 1.7 contacts, and the control group, 1.4 contacts by each novice teacher.

Table 2 about here

Differing school organization types related to attitudes of the novice teachers towards networking. The control group and the experimental restricted group had similar attitudes following the field experience towards the use of LAN technology, LAN use improves

communication, and LAN use improves teacher education. The experimental facilitated group was found to have more positive attitudes in these areas (table 3). To answer the first research question, how do differing school organization types relating to the use of LAN technology effect the communication patterns and attitudes of novice teachers, analysis of variance and post-hoc analysis (Scheffe test) were employed. Significant results were found with higher frequency of total contact (df = 55, F ratio = 7.46 , $p < 0.01$, squared mutiple R = .23), higher LAN contact (df = 43, F ratio = 62.04, $p < 0.01$, squared mutiple R = .59), and more positive attitudes towards the use of LAN technology (df = 55, F ratio = 7.33, $p < 0.01$, squared mutiple R = .21), LAN use improves communication (df = 55, F ratio = 4.36, $p = 0.02$, squared mutiple R = .14), and LAN use improves teacher education (df = 55, F ratio = 4.40, $p = 0.02$, squared mutiple R = .14). The experimental facilitated group, following the field experience, had higher results in these areas then other groups. Other differences were not significant.

Table 3 about here

Additional data was collected on communication partners and message content to further explore patterns and attitudes. Seventy-one percent of all LAN communications made by the experimental restricted group contacted university faculty, 25% supervisors and 4% peers. Among the experimental facilitated group, 49% interacted with faculty, 32% with supervisors and 19% with peers using the LAN network. It is apparent that greater use of LAN technology results in increased contact with non-primary individuals in the network, such as peers. The same result was found with the person initiating the communication for incoming contacts to novice teachers. Greater initiation was found by faculty and supervisors, 80% of all incoming LAN contacts, for the experimental restricted group, a convergent pattern. The experimental facilitated group had much higher initiated contact from peers, 44% of all incoming LAN contacts, and less from faculty and supervisors, 56%, a more divergent pattern (table 4). This type of use pattern may have demonstrated more familiarity and creativity with the LAN technology then the experimental restriced group.

Most communications between participants involved message content dealing with seeking help and approval in lesson planning, selection of alternative classroom activities and decisions in classroom management. Other, less frequently encountered communications dealt with identifying sources of materials, ideas for lessons, clarifying assignments, and novice teacher progress reports. The experimental

facilitated group had higher frequency of message content related to alternative classroom activities and classroom management than did the experimental restricted group (table 5).

Table 4 and 5 about here

The second research question related novice teacher background experience to attitude and use of LAN technology in a field setting. All novice teachers in the study were found to have had experience with computers. However, variations in extent of experience were evident along with use of other technology including facsimile machines and networking using computers (table 6). Due to training during this blocked set of courses, nearly all of the novice teachers had identical levels of experience with electronic mail and facsimile machines. Some novice teachers had experience with the LAN technology through previous office work. Correlations between novice teachers' previous computer networking and facsimile machine experiences with pre and post attitudes toward LAN technology and expected and actual frequency of communication in field experiences were small. Comparison of technology experiences with these variables using analysis of variance statistics were found not significant.

Tables 6 about here

Results of ratings and analysis of novice teacher lesson plans taught in their field classrooms, as related to planning models presented and practiced on campus, are reported in table 7. For the third research question, significant relationships with both attitude and frequency of use were found with these ratings. Using analysis of variance statistics with all novice teachers, attitude toward LAN use improves communication (df = 56, F ratio = 4.58 , p= 0.04), attitude toward LAN use improves teacher education (df = 56, F ratio =5.17 , p= 0.03) and frequency of LAN use (df = 56, F ratio = 7.10, p = .01) were found to be significant relationships with lesson plan performance. Attitudes towards the use of LAN technology was not related to lesson plan performance (df = 56, F ratio = 2.24 , p= 0.14). Not all single groups were found to have significant effects in these variables, however. See table 7. Only experimental facilitated group novice teachers, who had a more positive attitude, above the mean, toward LAN use improves communication (df = 18, F ratio = 4.68 , p= 0.05), or toward LAN use improves teacher education (df = 18, F ratio = 7.76 , p = 0.01), had higher ratings on planning of classroom lessons. Novice teachers in the experimental facilitated group who used LAN

technology in their schools to a greater extent than their peers, above the mean, also had significantly higher ratings on planning of classroom lessons(df = 18, F ratio = 7.91, $p < 0.01$). More positive attitudes or greater use of LAN technology did not relate to significantly higher ratings on planning of classroom lessons among the experimental restricted group or the control group novice teachers.

Table 7 about here

Conclusions and Implications

It was concluded that ease of contact, attitude toward use of technology in schools, types of message content, and frequency of the communications increased for participants in specific instructional organizations. The effects were related to novice teacher lesson plan performance in classrooms.

Differing school organization settings relating to the use of LAN technology in this study did effect the communication patterns and attitudes of novice teachers. It appeared that the administrative managers of the setting and the type of facilitation given by supervisors were primary factors in quality of communication and thus possible enhancement of the teacher education experience. This supports Fleming's (1989) view of the importance of the social setting in the final use of the technology.

Novice teacher experience characteristics in this setting were not related to attitude or eventual use of LAN technology. This result was found to differ from other studies relating to computer use in education. Koohang (1987) found that a person's attitude toward computers depended upon his or her ability to work with computers effectively. The lack of practical or real differences in background experiences of most of the novice teachers may have played a part in the present results. More studies are needed on background experience in this area.

The use of and attitude toward LAN technology, however, did relate to novice teachers planning of classroom lessons. The cause-effect status of this relationship cannot be determined here. Higher performing novice teachers in classroom lesson planning in this setting did report the LAN technology as more effective and used it more frequently. This was a characteristic of the more effective novice teacher in this setting. These teachers sought and received more information and feedback from a variety of people. More studies, with more attention to student reporting of personal events, are needed to determine whether and how this

feedback improved planning or would improve lower ability teachers' planning.

To understand LAN technology requires one to understand some of the social forces brought to bear on those who make the decisions using the technology. The results of this study have importance for teacher education programs as the new LAN technologies begin to be used more frequently. The study suggests that LAN technology can effectively support field-oriented programs. The time for the belief in teacher education that novice teachers can reach their highest potential without technology is past. The decision to give high priority to LAN technology should be one of the goals of teacher education. While further research with LAN technology is needed, this study should be helpful to teacher educators as they explore the full extent of the use of networking in their programs.

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Table 1

Weekly Sampled Frequency of Communication Initiated by Participant

		Participant Communication Group Totals (Percent)			
Novice Teacher Groups	N	Electronic Mail	Fax	Face to face Meeting or Phone on Campus	Total Communication Initiated
Novice Teacher	(58)	108 (65%)	10 (6%)	49 (29%)	167
Faculty	(4)	129 (62%)	24 (12%)	55 (26%)	208
Supervisors In Schools	(6)	22 (73%)	6 (20%)	2 (7%)	30

Table 2

Weekly Sampled Frequency of Communication Initiated by Communication Type and School Setting

		Novice Teachers' Group Totals (Mean)			
Novice Teacher Groups	N	Electronic Mail	Fax	Face to face Meeting or Phone on Campus	Total Communication Initiated
Control	13	0	0	18 (1.4)	18 (1.4)
Experimental Restricted	25	18 (0.7)	3 (0.1)	21 (0.8)	42 (1.7)
Experimental Facilitated	20	90 (4.5)	7 (0.4)	10 (0.5)	107 (5.4)

Table 3

Novice Teacher Attitudes Toward Networking/ Before and Following Field Experiences

	Attitude Toward						Frequency of Contact	
Novice Teacher Groups	Using LAN Networking		LAN Improved Communication in Setting		LAN Improved University Teacher Education		Weekly Total	
	Pre	Post	Pre	Post	Pre	Post	Pre	Actual
Control	3.5	3.6	3.7	3.6	3.7	3.8	2.4	0.0
Experimental Restricted	3.7	3.5	4.3	3.4	4.1	3.2	2.7	0.7
Experimental Facilitated	3.3	4.4*	3.4	4.0*	3.3	4.2*	2.7	4.5*

When Compared to the other groups at the same time.

* Significant at the $P \leq .05$ level using Scheffe test

Table 4

Novice Teacher LAN Network Interaction Partners, Expected and Actual (Before and After Field Experience)

Novice Teacher Group	Frequency of Contact				
	Faculty	Supervisor	Peers	Others	No Contact Made
Person Contacted:					
Control					
Expected	62	38	0	0	0
Actual	0	0	0	0	100
Experimental Restricted					
Expected	91	8	0	0	0
Actual	40	14	2	0	54
Experimental Facilitated					
Expected	85	15	0	0	0
Actual	38	25	15	0	22
Who Initiated Communication Contact with You:					
Control					
Expected	7	54	39	0	0
Actual	0	0	0	0	0
Experimental Restricted					
Expected	20	18	72	0	0
Actual	20	12	8	0	60
Experimental Facilitated					
Expected	35	25	40	0	0
Actual	25	25	40	0	10

Table 5

Novice Teacher Expected and Actual (Before and After Field Experience) Network Message Content

Novice Teacher Group	Topic of Communication (Percent responding)					
	Lesson Planning	Classroom Activities	Classroom Management	Personal Problems	Other	No Response
Control						
Expected	42	19	12	0	0	27
Actual	0	0	0	0	0	100
Experimental Restricted						
Expected	46	26	2	2	12	14
Actual	23	4	2	4	2	69
Experimental Facilitated						
Expected	50	20	5	3	3	20
Actual	38	25	15	0	0	22

Table 6

Novice Teacher Background Expertise in Technology

	Background Ranked on a Five Point Scale		
Novice Teacher Groups	Previous Computer Experience	Previous Electronic Mail Experience	Previous For Fax Experience
Control	3.1	1.1	1.4
Experimental Restricted	3.3	1.1	1.5
Experimental Facilitated	3.0	1.4	1.9

Table 7

Ratings of Novice Teacher Lesson Planning Performance

Lesson Planning Performance Related to Attitudes of LAN Use	Control Group Mean	Experimental Restricted Group Mean	Experimental Facilitated Group Mean
Lesson Planning Performance Overall Rating	85.8	84.7	85.4
LAN Improved Communication in Setting			
Low Rating (1)	84.0	83.5	78.3
High Rating (2)	86.7	84.1	87.2*
LAN Improved University Teacher Education			
Low Rating (1)	86.4	82.3	79.0
High Rating (2)	85.5	84.6	86.5*
LAN Use			
Low Rating (1)		83.1	77.1
High Rating (2)		84.8	88.2*

* Significantly different within group at the $P \leq .05$ level